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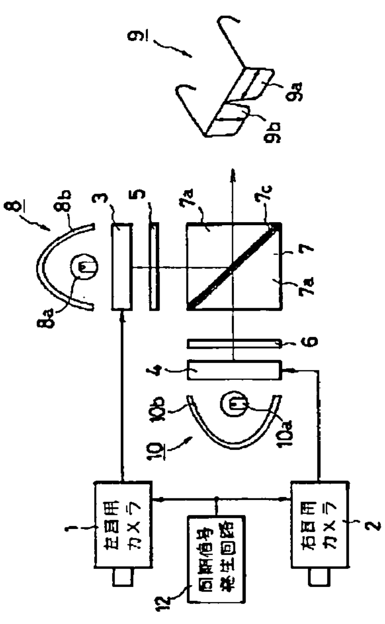
(54)【発明の名称】　立体映像表示装置

(57)【要約】

【構成】　左目用の映像信号で第１の透過型液晶パネル３を駆動することにより形成した左目用の映像光からＳ波偏光板５によりＳ波偏光成分取り出すとともに、右目用の映像信号で第２の透過型液晶パネル４を駆動することにより形成した右目用の映像光からＰ波偏光板６によりＰ波偏光成分を取り出し、このＳ波偏光成分及びＰ波偏光成分を偏光ビームスプリッタ７を用いて合成し映像光として出射する。

【効果】　上記Ｓ波偏光成分及びＰ波偏光成分の合成手段として上記偏光ビームスプリッタ７を用いているため、該合成手段としてハーフミラーを用いた場合と比較して略々２倍の明るさの立体映像光を得ることができる。



号を形成する右目用カメラ２と、同期信号を形成し、これを上記左目用カメラ１及び右目用カメラ２に供給する同期信号発生回路１２と、ハロゲンランプ８ａ及びリフレクタ８ｂからなり平行光を出射する左目用光源部８と、ハロゲンランプ１０ａ及びリフレクタ１０ｂからなり平行光を出射する左目用光源部１０と、上記左目用カメラ１からの左目用の映像信号により駆動され、上記左目用光源部８からの平行光から左目用の映像光を形成する左目用映像光形成手段である第１の透過型液晶パネル３と、上記右目用カメラ１からの右目用の映像信号により駆動され、上記右目用光源部１０からの平行光から右目用の映像光を形成する右目用映像光形成手段である第２の透過型液晶パネル４と、上記第１の透過型液晶パネル３からの左目用映像光から例えば第１の偏光成分であるＳ波成分を取り出す第１の偏光手段であるＳ波偏向板５と、上記第２の透過型液晶パネル４からの右目用映像光から、上記Ｓ波成分に対して直交する第２の偏光成分であるＰ波成分を取り出す第２の偏光手段であるＰ波偏光板６と、上記Ｓ波偏向板５を介して照射されるＳ波偏光成分及び上記Ｐ波偏光板６を介して照射されるＰ波偏光成分を合成して映像光を形成する偏光ビームスプリッタ７とを有している。

【００１１】また、上記立体映像表示装置は、上記偏光ビームスプリッタ７からの映像光のうち、上記Ｓ波偏光成分のみが透過するような偏光処理の施された左目用覗き部９ａ及び上記Ｐ波偏光成分のみが透過するような偏光処理の施された右目用覗き部９ｂが設けられた偏光手段である偏光眼鏡９とを有している。

【００１２】上記偏光ビームスプリッタ７は、例えば２個のガラスの直角プリズム７ａ，７ｂの間に偏光依存性を持つ誘電体多層膜７ｃが挿入されており、Ｓ波成分を反射し、Ｐ波成分を透過させるようになっている。なお、通常、偏光ビームスプリッタは、１つの入射面から入射される光をＳ波成分及びＰ波成分に分離し、該Ｓ波成分及びＰ波成分を別々の出射面から出射するように用いられるが、本実施例の場合、上記偏光ビームスプリッタ７は、Ｓ波成分を出射する出射面が上記Ｓ波偏光板５からのＳ波成分の入射面となり、Ｐ波成分を出射する出射面が上記Ｐ波偏光板６からのＰ波成分の入射面となり、光が入射される面が上記Ｓ波成分及びＰ波成分を合成して形成された映像光が出射される出射面となるように設置されている。

【００１３】次に、このような構成を有する本実施例に係る立体映像表示装置の動作を説明する。まず、図１において、本実施例に係る立体映像表示装置は、所望の映像の投写が開始されると、上記ハロゲンランプ８ａ，１０ａがそれぞれ点灯駆動され、左目用光源部８及び右目用光源部１０からそれぞれ平行光が出射される。

【００１４】上記平行光は、それぞれ上記第１の透過型液晶パネル３及び上記第２の透過型液晶パネル４に照射される。

【００１５】一方、所望の映像の投写が開始されると、同期信号発生回路１２が左目用カメラ１及び右目用カメラ２にそれぞれ同期信号を供給する。これにより、上記左目用カメラ１が人間の左目でとらえた被写体の映像信号（左目用の映像信号）を、また、上記右目用カメラ２が人間の右目でとらえた被写体の映像信号（右目用の映像信号）をそれぞれ同時に出力する。

【００１６】上記左目用カメラ１からの左目用の映像信号は上記第１の透過型液晶パネル３に、また、上記右目用カメラ２からの右目用の映像信号は上記第２の透過型液晶パネル４にそれぞれ供給される。

【００１７】上記第１の透過型液晶パネル３は上記左目用の映像信号に応じて駆動され、上記第２の透過型液晶パネル４は上記右目用の映像信号に応じて駆動される。これにより、上記第１の透過型液晶パネル３を透過する上記左目用光源部８からの平行光は左目用の映像光とされ、上記Ｓ波偏光板５に照射される。また、上記第２の透過型液晶パネル４を透過する右目用光源部１０からの平行光は右目用の映像光とされ、上記Ｐ波偏光板６に照射される。

【００１８】なお、上記左目用の映像光及び右目用の映像光を形成する手段として、いわゆるＣＲＴ（陰極線管）を用いることもできるが、透過型液晶パネルを用いることにより、該左目用映像光及び右目用映像光の合成系を小さくまとめることができ、当該立体映像表示装置の小型化を図ることができる。このため、大きな会場のみならず小さな会場や家庭内で当該立体映像表示装置の使用を可能とすることができる等のように用途を広げることができるうえ、一般家庭への普及に貢献することができる。

【００１９】上記Ｓ波偏光板５は、上記左目用の映像光からＳ波成分を取り出し、これを上記偏光ビームスプリッタ７に照射する。また、上記Ｐ波偏光板６は、上記右目用の映像光からＰ波成分を取り出し、これを上記偏光ビームスプリッタ７に照射する。

【００２０】上述のように、上記偏光ビームスプリッタ７は、Ｓ波成分を反射しＰ波成分を透過させる誘電体多層膜７ｃが挿入されているため、上記Ｓ波偏光板５から照射されるＳ波偏光成分は当該偏光ビームスプリッタ７により反射され、また、上記Ｐ波偏光板６から照射されるＰ波偏光成分は当該偏光ビームスプリッタ７を透過する。

【００２１】このため、上記左目用の映像光に対応するＳ波偏光成分及び上記右目用の映像光に対応するＰ波偏光成分が合成され、上記偏光ビームスプリッタ７から図示しないスクリーンに投写されることとなる。

【００２２】上記偏光ビームスプリッタ７は、上記Ｓ波成分の反射率及び上記Ｐ波成分の透過率が高いため、上記スクリーンに投写される映像光の光量をハーフミラー

【0032】また、実施例効果として、上記第1の偏光手段からの第1の偏光成分及び上記第2の偏光成分を合成する際に、上記偏光ビームスプリッタを用いて合成することにより、該第1の偏光成分及び第2の偏光成分をハーフミラーを用いて合成したときと比較して略々2倍の明るい立体映像を提供することができる。また、左目用映像光形成手段及び右目用映像光形成手段として透過型液晶パネルを用いることにより、スクリーンに投写する映像光の形成系を小さくまとめることができ、当該立体映像表示装置の小型化を図ることができる。

【0033】また、上記小型化を図ることができるため、大きな会場のみならず小さな会場や家庭内での使用をも可能とすることができる等のように用途を広げることができるうえ、一般家庭への普及に貢献することができる。

【図面の簡単な説明】

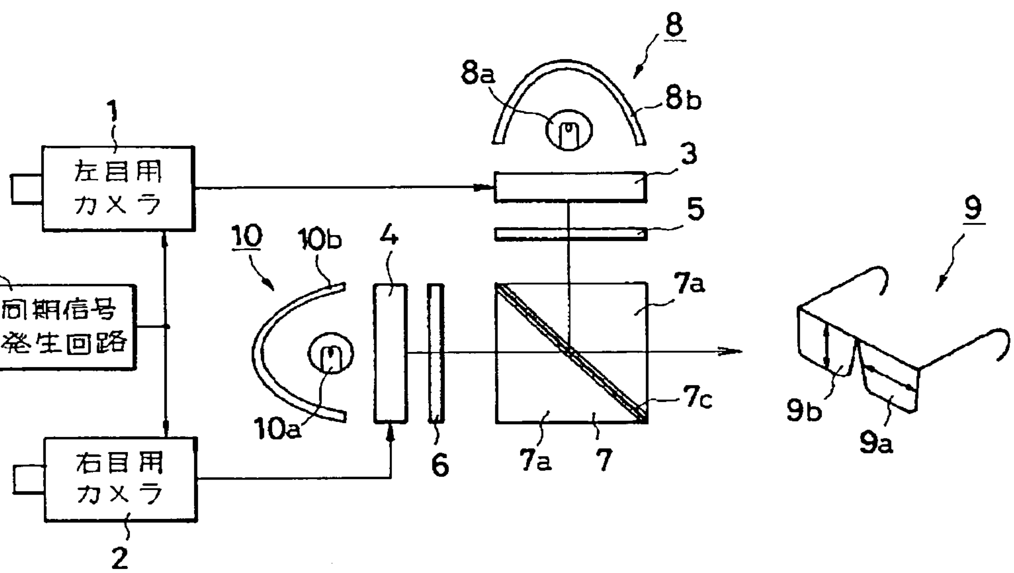
【図1】本発明に係る実施例の立体映像表示装置のブロック図である。

【図2】上記実施例の立体映像表示装置を覗き部と一体形成する際に該覗き部に設けられる覗き窓の一例を示す斜視図である。

【符号の説明】

1・・・・・・・・・・・左目用カメラ
2・・・・・・・・・・・右目用カメラ
3・・・・・・・・・・・第1の透過型液晶パネル
4・・・・・・・・・・・第2の透過型液晶パネル
5・・・・・・・・・・・S波偏光板
6・・・・・・・・・・・P波偏光板
7・・・・・・・・・・・偏光ビームスプリッタ
7a，7b・・・・・・ガラス
7c・・・・・・・・・・誘電体多層膜
8・・・・・・・・・・・左目用光源部
8a・・・・・・・・・・ハロゲンランプ
8b・・・・・・・・・・リフレクタ
9・・・・・・・・・・・偏光眼鏡
9a・・・・・・・・・・左目用覗き部
9b・・・・・・・・・・右目用覗き部
10・・・・・・・・・・右目用光源部
10a・・・・・・・・・ハロゲンランプ
10b・・・・・・・・・リフレクタ
12・・・・・・・・・・同期信号発生回路
20・・・・・・・・・・覗き窓
20a・・・・・・・・・左目用覗き部
20b・・・・・・・・・右目用覗き部

【図1】



# EUROPEAN PATENT OFFICE


## Patent Abstracts of Japan

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APPLICATION NUMBER : 03351304



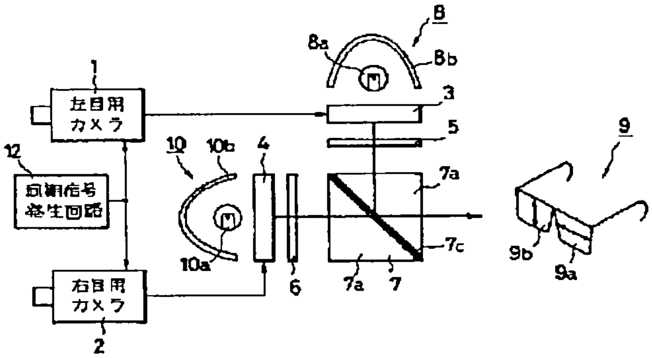
APPLICANT : SONY CORP;

INVENTOR : MIYAZAWA YASUO;



INT.CL. : H04N 13/00


TITLE : STEREOSCOPIC VIDEO DISPLAY DEVICE





ABSTRACT : PURPOSE: To obtain a bright stereoscopic image by using a polarized beam splitter as a means to synthesize a video beam for left eye and a video beam for right eye.

CONSTITUTION: A video signal from a camera 1 for left eye and a video signal from a camera 2 for right eye are simultaneously outputted, and the video beams for left eye and right eye are formed by respectively driving transmissive liquid crystal panels 3 and 4. Then, an S wave polarizing component is extracted from the video beam for left eye by an S wave polarizing board 5, and the polarized beam splitter 7 is irradiated with this component to reflect the S wave polarizing component and to transmit a P wave polarizing component. On the other hand, the P wave polarizing component is extracted from the video beam for right eye by a P wave polarizing board 6, and the polarized beam splitter 7 is irradiated with this component. Then, the video beams are formed by synthesizing the S wave polarizing component and the P wave polarizing component on the polarized beam splitter 7 and projected on a screen.

9. Japan Patent Office (JP) **12. Japan Laid-open Patent Gazette (A)** 11. Patent Application Laid-open No.

**1993-168046**

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| H 04 N 13/00 | | 8839-5C | F1 | Technology display section |

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(54) [Title of the Invention] Stereoscopic image display device

(57) [Abstract]

[Constitution] An S-wave polarized beam component is extracted by an S-wave polarizer 5 from the video beam for the left eye formed by driving a first transmissive liquid crystal panel 3 by means of a video signal for the left eye, and at the same time, a P-wave polarized beam component is extracted by a P-wave polarizer 6 from the video beam for the right eye formed by driving a second transmissive liquid crystal panel 4 by means of a video signal for the right eye, and then a polarized beam splitter 7 is used to combine the S- and P-wave polarized beam components and project them as video beams.

[Effects] Since said polarized beam splitter 7 is used as a means of combining said S- and P-wave polarized beam components, the brightness of the obtained stereoscopic image is approximately twice that of an image obtained using a half mirror as the combining means.

[Claims]

[Claim 1] A stereoscopic image display device provided with a left-eye image beam formation means that forms the image beam for the left eye by means of an image signal for the left eye;

a right-eye image beam formation means that forms the image beam for the right eye by means of an image signal for the right eye;

a first polarizing means that extracts a first polarized beam component by polarizing the image beam for the left eye from said left-eye image beam formation means;

a second polarizing means that extracts a second polarized beam component, which is orthogonal to said first polarized beam component, by polarizing the image beam for the right eye from said right-eye image beam formation means;

a polarizing beam splitter that forms an image beam by combining the first polarized beam component from said first polarizing means with the second polarized beam component from said second polarizing means; and with

a polarizing means provided with a first eyepiece that is polarized to transmit only said first polarized beam component of the image beam from said polarizing beam splitter and with a second eyepiece that is polarized to transmit only said second polarized beam component.

[Detailed Explanation of the Invention]

[0001]
[Industrial Field of Application] The present invention relates to a stereoscopic image display device that stereoscopically displays the desired image.

[0002]
[Prior Art] A stereoscopic image display device has been known that projects the image beam for the right eye and the image beam for the left eye onto different surfaces simultaneously and produces a stereoscopic image by means of a pair of polarized glasses. This type of conventional stereoscopic image display device drives a first liquid crystal panel by means of the image signal for the left eye and drives a second liquid crystal panel by means of the image signal for the right eye. As a result, said first liquid crystal panel forms an image beam for the left eye, and said second liquid crystal panel forms an image beam for the right eye. Said image beam for the left eye is polarized to an S-wave by an S-wave polarizer, for example, and is projected onto a half mirror. Additionally, said image beam for the right eye is polarized to a P-wave, that is orthogonal to said S-wave, by a P-wave polarizer and is projected onto said half mirror.

[0003] Said half mirror combines the image beam for the left eye polarized into said S-wave with the image beam for the right eye polarized into said P-wave, and projects these beams onto a screen. The image beam combined by said half mirror and projected onto the screen is viewed through, for example, a pair of polarized glasses consisting of an eyepiece that is polarized to transmit only said S-wave and that corresponds to the left eye and an eyepiece that is polarized to transmit only said P-wave and that corresponds to the right eye.

[0004] As a result, of the image projected onto said screen, said image beam for the left eye is recognized only by the left eye while said image beam for the right eye is recognized only by the right eye, thus allowing the image projected onto said screen to be stereoscopically recognized.

[0005]
[Problems that the Invention is to Solve] However, the fact that said conventional stereoscopic image display device uses said half mirror as the means of combining said image beams for the left and right eyes reduces the amount of light by half, thereby causing the image projected onto the screen to be dark.

[0006] The present invention has been developed in view of the aforementioned problem, and its object is to provide a stereoscopic image display device that can produce a bright stereoscopic image.

[0007]
[Means of Solving the Problems] The stereoscopic image display device related to the present invention has a left-eye image beam formation means that forms the image beam for the left eye by means of an image signal for the left eye; a right-eye image beam formation means that forms the image beam for the right eye by means of an image signal for the right eye; a first polarizing means that extracts a first polarized beam component by polarizing the image beam for the left eye from said left-eye image beam formation means; a second polarizing means that extracts a second polarized beam component, that is orthogonal to said first polarized beam component, by polarizing the image beam for the right eye from said right-eye image beam formation means; a polarizing beam splitter

that forms an image beam by combining the first polarized beam component from said first polarizing means with the second polarized beam component from said second polarizing means, and a polarizing means provided with a first eyepiece that is polarized to transmit only said first polarized beam component of the image beam from said polarizing beam splitter and with a second eyepiece that is polarized to transmit only said second polarized beam component.

[0008]

[Operation of the Invention] According to the stereoscopic image display device related to the present invention, the left-eye image beam formation means forms the image beam for the left eye by means of the image signal for the left eye; the right-eye image beam formation means forms the image beam for the right eye by means of the image signal for the right eye; the first polarizing means extracts the first polarized beam component by polarizing the image beam for the left eye from said left-eye image beam formation means; the second polarizing means extracts the second polarized beam component, that is orthogonal to said first polarized beam component, by polarizing the image beam for the right eye from said right-eye image beam formation means; and the polarizing beam splitter forms an image beam by combining the first polarized beam component from said first polarizing means with the second polarized beam component from said second polarizing means, thus allowing a bright image beam to be projected onto a screen.

[0009] Furthermore, since said image projected onto said screen is viewed through the polarizing means provided with the first eyepiece that is polarized to transmit only said first polarized beam component of said image beam projected on said screen and with the second eyepiece that is polarized to transmit only said second polarized beam component, a bright stereoscopic image can be provided.

[0010]

[Embodiments] An embodiment of the stereoscopic image display device related to the present invention is explained below, referencing drawings. First, as shown in FIGURE 1, the stereoscopic image display device related to the present invention has a left-eye camera 1 for forming image signals for the left eye; a right-eye camera 2 for forming image signals for the right eye; a synchronizing-signal generation circuit 12 that generates a synchronization signal and supplies it to said left-eye camera 1 and right-eye camera 2; a left-eye light source 8 that is comprised of a halogen lamp 8a and a reflector 8b and that emits parallel light rays; a left-eye* [**ILC note: "right-eye" appears to be the correct term here*] light source 10 that is comprised of a halogen lamp 10a and a reflector 10b and that emits parallel light rays; a first transmissive liquid crystal panel 3, which is a left-eye image beam formation means that is driven by the image signals for the left eye from said left-eye camera 1 and that forms the image beam for the left eye from the parallel beams from said left-eye light source 8; a second transmissive liquid crystal panel 4, which is a right-eye image beam formation means that is driven by the image signals for the right eye from said right-eye camera 1* [**ILC note: this should probably be "2"*] and that forms the image beam for the right eye from the parallel beams from said right-eye light source 10; an S-wave polarizer 5, which is a first polarization means that extracts, for example, the S-wave component, i.e., a first polarized beam component, from the left-eye image beam from said first transmissive liquid crystal panel 3; a P-wave polarizer 6, which is a second polarization means that extracts the P-wave component, i.e., a second polarized beam component that is orthogonal to said S-wave component, from the right-eye image beam from said second transmissive liquid crystal panel 4; and a polarized beam splitter 7 that forms an image beam by combining the S-wave polarized beam component projected via said S-wave polarizer 5 with the P-wave polarized beam component projected via said P-wave polarizer 6.

[0011] Furthermore, said stereoscopic image display device has a pair of polarized glasses 9, which acts as a polarizing means provided with a left-eye eyepiece 9a that is polarized to transmit only said S-wave polarized beam component out of the image beam from said polarized beam splitter 7, and with a right-eye eyepiece 9b that is polarized to transmit only said P-wave polarized beam component.

[0012] Said polarized beam splitter 7 has a dielectric multi-layer film 7c having polarized light dependency inserted between two rectangular glass prisms 7a and 7b, for example, and is configured to reflect the S-wave component and transmit the P-wave component. Note that a polarized beam splitter is normally used to separate a light beam entering from a single plane of incidence into S- and P-wave components, and to emit said S- and P-wave components from separate outgoing planes. However, in the present embodiment, in said polarized beam splitter 7, the outgoing plane through which the S-wave component goes out becomes the plane of incidence for the S-wave component from said S-wave polarizer 5, and the outgoing plane through which the P-wave component goes out becomes the plane of incidence for the P-wave component from said P-wave polarizer 6. In other words, the plane through which light enters is positioned such that it becomes the outgoing plane through which the image beam formed by combining said S- and P-wave components goes out.

[0013] Next, the operation of a stereoscopic image display device related to the present embodiment having such a configuration is explained. First, in the stereoscopic image display device related to the present embodiment in FIGURE 1, when projection of the desired image begins, said halogen lamps 8a and 10a are lit, and a parallel light beam is emitted from the left-eye light source 8 and the right-eye light source 10, respectively.

[0014] Said parallel light beams are radiated onto said first transmissive liquid crystal panel 3 and said second transmissive liquid crystal panel 4, respectively.

[0015] Meanwhile, when projection of the desired image begins, the synchronizing-signal generation circuit 12 supplies a synchronization signal to the left-eye camera 1 and right-eye camera 2. As a result, said left-eye camera 1 simultaneously outputs both the image signal of an object that would be captured by the human left eye (image signal for the left eye) while said right-eye camera 2 outputs the image signal of the object that would be captured by the human right eye (image signal for the right eye).

[0016] The image signal for the left eye from said left-eye camera 1 is supplied to the first transmissive liquid crystal panel 3 while the image signal for the right eye from said right-eye camera 2 is supplied to the second transmissive liquid crystal panel 4.

[0017] Said first transmissive liquid crystal panel 3 is driven according to said image signal for the left eye while said second transmissive liquid crystal panel 4 is driven according to said image signal for the right eye. As a result, the parallel light beam from said left-eye light source 8 passing through said first transmissive liquid crystal panel 3 becomes the image beam for the left eye and is irradiated onto said S-wave polarizer 5. Meanwhile, the parallel light beam from said right-eye light source 10 passing through said second transmissive liquid crystal panel 4 becomes the image beam for the right eye and is irradiated onto said P-wave polarizer 6.

[0018] So-called CRTs (cathode ray tubes) can be used as the means of forming said image beams for the right and left eyes. However, using transmissive liquid crystal panels makes it possible to reduce the size of the system for combining said image beams for the right and left eyes, resulting in a compact size for said stereoscopic image display device. As a result, said stereoscopic image display device can be used in a wide range of applications. For example, it can be used not only in large venues but in small venues and homes as well, thus helping spread the use of stereoscopic image display devices in homes.

[0019] Said S-wave polarizer 5 extracts the S-wave component from the image beam for the left eye, and irradiates it onto said polarized beam splitter 7. Meanwhile, the P-wave polarizer 6 extracts the P-wave component from the image beam for the right eye, and irradiates it onto said polarized beam splitter 7.

[0020] As described above, the dielectric multi-layer film 7c, which reflects the S-wave component and transmits the P-wave component, is inserted into said polarized beam splitter 7, causing the S-wave polarized beam component irradiated from said S-wave polarizer 5 to be reflected by said polarized beam splitter 7 while the P-wave polarized beam component irradiated from said P-wave polarizer 6 passes through said polarized beam splitter 7.

[0021] As a result, said S-wave polarized beam component corresponding to the image beam for the left eye and said P-wave polarized beam component corresponding to the image beam for the right eye are combined together and projected onto a screen, not shown in the figure, from said polarized beam splitter 7.

[0022] The fact that said polarized beam splitter 7 reflects said S-wave component and transmits said P-wave component at high rates causes nearly double the volume of light to be projected onto said screen, compared to a case in which half mirrors are used. This allows the projection of bright image beams onto said screen.

[0023] As described above, since the left-eye eyepiece 9a of said polarized glasses 9 is polarized to transmit only the S-wave polarized component while said right-eye eyepiece 9b is polarized to transmit only the P-wave component, the S-wave polarized beam component of the image beam projected onto said screen, which corresponds to the image beam for the left eye, is recognized by the left eye via said left-eye eyepiece 9a, while the P-wave polarized beam component corresponding to the image beam for the right eye is recognized by the right eye via said right-eye eyepiece 9b. This allows the image projected onto said screen to be stereoscopically recognized.

[0024] As is clear from the above explanation, by simultaneously outputting the image signal for the left eye from the left-eye camera 1 and the image signal for the right eye from the right-eye camera 2; driving the first transmissive liquid crystal panel 3 with said image signal for the left eye, forming the image beam for the left eye; driving the second transmissive liquid crystal panel 4 with said image signal for the right eye, forming the image beam for the right eye; using the S-wave polarizer 5 to extract the S-wave polarized beam component from the image beam for the left eye formed by said first transmissive liquid crystal panel 3 and projecting this S-wave polarized beam component onto said polarized beam splitter 7, which reflects the S-wave polarized beam component but transmits the P-wave polarized beam component; using the P-wave polarizer 6 to extract the P-wave polarized beam component from the image beam for the right eye formed by said second transmissive liquid crystal panel 4 and projecting it onto said polarized beam splitter 7; and using said polarized beam splitter 7 to combine said S- and P-wave polarized beam components to form an image beam and project it onto the screen, the stereoscopic image display device related to the present embodiment can project an image beam having nearly double the volume of light onto said screen compared to a case in which half mirrors are used as means of combining said S- and P-wave polarized beam components.

[0025] Furthermore, since transmissive liquid crystal panels are used as the means of forming said image beams for the left and right eyes, it is possible to reduce the size of the system for combining said image beams for the right and left eyes, resulting in a compact size for said stereoscopic image display device. As a result, said stereoscopic image display device can be used in a wide range of applications. For example, it can be used, not only in large venues but in small venues and homes as well, thus helping spread the use of stereoscopic image display devices in homes.

[0026] Additionally, the fact that the image beam projected onto said screen is viewed through the polarized glasses 9 having the left-eye eyepiece 9a polarized to transmit only the S-wave polarized beam component corresponding to said image beam for the left eye and the right-eye eyepiece 9b polarized to transmit only the P-wave polarized beam component corresponding to said image beam for the right eye allows the image projected onto said screen to be stereoscopically recognized. As described above, the image projected onto said screen has nearly double the volume of light compared

to a case in which half mirrors are used as means of combining said image beams for the left and right eyes, resulting in a stereoscopic image that is twice as bright.

[0027] In the aforementioned embodiment, the image beam formed by said polarized beam splitter 7 is projected onto said screen, and the image projected onto this screen is viewed through said polarized glasses 9. However, by integrally forming in said stereoscopic image display device, a window 20 having both a left-eye window 20a polarized to transmit only the S-wave polarized beam component corresponding to said image beam for the left eye and a right-eye window 20b polarized to transmit only the P-wave polarized beam component corresponding to said image beam for the right eye, as shown in FIGURE 2 for example, and by projecting said S- and P-wave polarized beam components onto said window 20, a stereoscopic image can be obtained without using said polarized glasses 9.

[0028] Furthermore, even if so-called CRTs (cathode ray tubes) are used instead of said first and second transmissive liquid crystal panels 3 and 4, a bright image can still be obtained since said polarized beam splitter 7 reflects said S-wave component and transmits said P-wave component at high rates.

[0029] In said embodiment, said image signals for the left and right eyes are output from cameras 1 and 2, respectively. However, any devices that can output synchronized images signals for the left and right eyes, such as optical disk players and video cassette recorders, can of course also be employed.

[0030]
[Effects of the Invention] The stereoscopic image display device related to the present invention can project a bright image beam onto a screen because a left-eye image beam formation means forms the image beam for the left eye by means of an image signal for the left eye; a right-eye image beam formation means forms the image beam for the right eye by means of an image signal for the right eye; a first polarizing means extracts a first polarized beam component by polarizing the image beam for the left eye from said left-eye image beam formation means; a second polarizing means extracts a second polarized beam component, that is orthogonal to said first polarized beam component, by polarizing the image beam for the right eye from said right-eye image beam formation means; a polarizing beam splitter forms an image beam by combining the first polarized beam component from said first polarizing means with the second polarized beam component from said second polarizing means; and said polarized beam splitter is used as the means of combining the first polarized beam component with the second polarized beam component.

[0031] Furthermore, by having said image beam projected onto said screen viewed through a polarizing means provided with a first eyepiece that is polarized to transmit only said first polarized beam component of the image beam projected onto said screen as well as with a second eyepiece that is polarized to transmit only said second polarized beam component, the present embodiment can provide a bright stereoscopic image.

[0032] Moreover, by using said polarized beam splitter to combine the first polarized beam component from said first polarizing means with the second polarized beam component from said second polarizing means, an embodiment of the present invention can provide a stereoscopic image that is nearly twice as bright as that provided when half mirrors are used for combining said first and second polarized beam components. Additionally, using first transmissive liquid crystal panels as the means of forming image beams for the left and right eyes makes it possible to reduce the size of the system for forming the image to be projected onto the screen, resulting in a compact size for said stereoscopic image display device.

[0033] Furthermore, said resulting compact size makes it possible to use the stereoscopic image display device in a wide range of applications. For example, it can be used, not only in large venues, but in small venues and homes as well, helping spread the use of stereoscopic image display devices in homes.

[Brief Explanation of Drawings]

[FIGURE 1] A block diagram of the stereoscopic image display device in an embodiment related to the present invention.

[FIGURE 2] A perspective diagram illustrating an example of a window to be provided in the eyepiece when the eyepiece is to be integrally formed with the stereoscopic image display device in said embodiment.

[Explanation of Symbols]
1 ... Left-eye camera
2 ... Right-eye camera
3 ... First transmissive liquid crystal panel
4 ... Second transmissive liquid crystal panel
5 ... S-wave polarizer
6 ... P-wave polarizer
7 ... Polarized beam splitter
7a and 7b ... Glass
7c ... Dielectric multi-layer film
8 ... Left-eye light source
8a ... Halogen lamp
8b ... Reflector
9 ... Polarized glasses
9a ... Left-eye eyepiece
9b ... Right-eye eyepiece
10 ... Right-eye light source
10a ... Halogen lamp
10b ... Reflector
12 ... Synchronizing-signal generation circuit
20 ... Window
20a ... Left-eye window
20b ... Right-eye window

[FIGURE 1]
1: Left-eye camera
12: Synchronizing-signal generation circuit
2: Right-eye camera